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ABSTRACT

Increasing demands for more information more quickly has called into serious question the traditionally fragmented nature of library service by creating a need for greater interlibrary cooperation. Libraries have responded to this need by the formation of networks which are nothing more nor less than a formalized tool for interlibrary cooperation. This study of five regional reference networks in the State of Ohio has emerged as an outcome of the cooperation of state and local library personnel. The purpose was to analyze five of the Regional Reference and Information Networks in Ohio from a comparative viewpoint. The networks selected are: Appalachia Improved Reference Services (AIRS), Cleveland Area Interlibrary Network (CAIN), Miami Valley Library Organization (MILO) Information Exchange Project, Southwestern Ohio Rural Libraries (SWORL), and Western Erie Library Development (WELD). The study sought to compare the finance, organization and scope of the networks and to evaluate the networks using three key criteria: service to the patron, time taken to provide the service, and cost of that service. (Author/SJ)

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# A COMPARATIVE ANALYSIS
# OF FIVE REGIONAL REFERENCE
# AND INFORMATION NETWORKS

By: Michael W. Spicer

For: The State Library of Ohio

Date: August 18, 1972

LI 004 062

# PREFACE

This study of five regional reference networks in the State of Ohio has emerged as an outcome of the cooperation of state and local library personnel throughout the State. Special thanks are due to the following for their valuable assistance in collecting data: Miss Florence Efkeman, Head of the Information Desk at the Public Library of Cincinnati and Hamilton County; Mr. Dennis M. Gormley, Coordinator for the CAIN network; Mr. Clark S. Lewis, Librarian at New Philadelphia-Tuscarawas County Public Library; Miss Barbara Micheel, Project Director for the SWORL network, Mr. Don Paul, Project Coordinator for the MILO network; Mrs. Nancy Swegan, Project Coordinator for the WELD network; Miss Barbara P. Taylor, Head of Business and Technology at Stark County District Library in Canton, Mr. Kenneth Tewell, Librarian of Coshoction Public Library; and Mrs. Margaret Walters, Project Director for the AIRS network.

The author also considers himself fortunate in receiving the guidance of Mr. Richard R. Palmer, State Library Development Consultant for Reference and Information Networks, whose wisdom and wit proved a constant source of strength throughout the study.

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## I. INTRODUCTION

The increasing demands of more citizens for more information more quickly has called into serious question the traditionally fragmented nature of library service by creating a need for greater interlibrary cooperation. An important way in which libraries have responded to such a need has been the formation of networks at a regional and state level partly encouraged by federal programs such as set up by the Library Services and Construction Act (LSCA). Such networks represent nothing more nor less than a formalised tool for interlibrary cooperation. By cooperation within a network, libraries can work together combining materials, services and expertise to provide a quality of service each could not achieve separately.

The State of Ohio, in spite of its numerous magnificent public and academic libraries and its tradition of county-wide library service, has recognised, partly as a result of the 1968 Blasingame report, the need for the formalised cooperation that networks provide to ensure greater evenness in the quantity, quality and availability of library resources and services. Such recognition formed the basic theme of the Ohio Library Development Plan and has speeded the development of both state and local reference and information networks.

The rapid growth of these networks and large variations in their structure and scope have created a need for meaningful analysis in terms of inputs and outputs to ensure that the citizens of Ohio receive maximum value for the tax dollars expended and this study was an attempt in part to respond to that need.

The purpose of this study was to analyse five of the Regional Reference and Information networks in Ohio (see fig.1) from a comparative viewpoint. The networks selected were:

(I) Appalachia Improved Reference Services (AIRS)

(II) Cleveland Area Interlibrary Network (CAIN)

(III) Miami Valley Library Organization (MILO) Information Exchange Project

(IV) Southwestern Ohio Rural Libraries (SWORL)

(V) Western Erie Library Development (WELD)

The study sought to compare the finance, organisation and scope of the networks and to evaluate the networks using three key criteria.
1) Service to the patron 2) Time taken to provide the service 3) Cost of that service. These criteria were put forward by Maryann Duggan of the Southern Methodist University in Dallas, Texas as part of a study of networks in that state. (see Journal of Library Automation, September 1969, p. 157 - 175.)

## II. FINANCE, ORGANISATION, SCOPE

When analysing a reference and information network in terms of inputs and outputs three variables are crucial; finance, which determines the amount of input, organisation, which processes the input into an output and the scope of services, which is the output.

### (1) FINANCE

All of the regional networks studied except CAIN received partial federal funding under Title I of the Library Services and Construction Act. The remainder of their income being derived from a share of local funds from intangibles tax allocation. CAIN relies exclusive on local funding.

Other minor sources of income include private contributions, such as the donation of a typewriter to the MILO network and charges to the patron for postage and photocopying.

### (2) ORGANISATION

In comparing organisation among the five networks, attention should be focused on central coordination, organisational hierarchy and channels for communication of requests and distribution of replies.

(i) Central Coordination

All five networks seem to share for the most part a common framework for coordination, consisting of a committee or committees responsible for overall planning and policy making and a project director or coordinator, responsible to the committee for the administration of the network. MILO has a temporary part-time project adviser to assist the project director in implementing in-service and educational programs in the network and to act as a liaison between the libraries and the committee. CAIN has special advisors to provide needed expertise. Other variations also exist within each network but the networks do not significantly deviate from the above basic framework.

(ii) Organisational Hierarchy

This specifies the direction of communication channels and message flow pattern. Networks may be classified as centralised or decentralised. In a centralised network, when a member library is unable to satisfy a patron's request, it sends the request to one central resource library, which attempts to find a reply and send it to the patron either directly or via the member library. In a decentralised network, there is no one resource library and indeed all member libraries may serve as resource libraries.

SWORL and WELD seem closest to being a centralised network. Member libraries of SWORL use the Public Library and Cincinnati and Hamilton County as a resource center for both reference questions and interlibrary loan requests. The Public Library of Cincinnati and Hamilton County is not a member library of SWORL but is under contract to the network to supply the services of a resource center. Member libraries of WELD use the Toledo-Lucas County Public Library, which is a member of the network, as a resource center.

The Dayton and Montgomery County Public Library is the resource center for the MILO network, but it may, on receiving requests for periodical photocopies which it cannot provide, contact a member library which has the periodical, using the "Miami-Valley Union List of Serials", and have that library send photocopies to the requesting library or to the patron directly. In such a case, the Dayton and Montgomery Public Library is billed for the service. However, MILO may generally be characterised as a centralised network.

The AIRS Network is closest to being a decentralised network. In theory, all the member libraries are resource libraries but in practice the superior collections of Coshocton Public Library, Dover Public Library, and New Philadelphia-Tuscarawas County District Library have established them as main resource centers. In addition, AIRS has a contract with Stark County District Library in Canton to provide a backup service for answering patrons requests.

The CAIN network lies somewhere between a centralised and decentralised network. While Cleveland Public Library is the center for all CAIN reference requests, title requests are communicated to most member libraries by means of a teletype network. Cleveland Public Library attempts to answer such title requests first, but those title requests unanswered are taken by other member libraries. As a result, while Cleveland Public Library is the largest lender of materials, it is still answers less than 50% of total CAIN requests.

Whether a network tends to be centralised or decentralised depends in part on the willingness and ability of any one library within the network to take on the role of a resource center. The larger number of resource libraries in AIRS must be attributed somewhat to the lack of a single library with a collection adequate to fill all AIRS requests. The absence of a single resource center for title requests in the CAIN network is attributable to the ability and willingness of several member libraries to fill such requests and perhaps in part to the early unwillingness of Cleveland Public Library to assume the role of resource center.

Given that one library is able and willing to take on the role of resource center, a centralised network would seem advantageous. Under a decentralised network a member library may have to call more than one library before finding a reply to a patron's request. For example in the AIRS network, a member library may go to the expense of calling all three resource libraries and then still have to call Stark County District Library in order to find the resources it needs. In CAIN this problem is eliminated largely by a teletype network where most member libraries are quickly aware of requests made by any one of them.

(iii) Channels

The type of channels used for communicating requests and replies and distributing resources is obviously a crucial variable. For the communication of requests and also replies not requiring materials, AIRS, MILO, SWORL, and WELD rely almost exclusively on the telephone or mail. CAIN has a teletype network used by all but two member libraries, which are linked to the network by telephone. CAIN also has a telecopier network but this is limited as yet. For the distribution of materials such as books, all networks use the mail except CAIN, which has access to the delivery system of the Cleveland Public Library. All networks except MILO have all materials delivered to the library which requested them. In the MILO network, while books are mailed to libraries, photocopies are often mailed direct to the patron.

### (3) Scope

All five networks seek to raise the level of service which local libraries can give their patrons by the provision of a shared source of services of information and materials. All the networks provide for the answering of reference questions, both general and specific, for the making and delivery of photocopies requested and, with the exception of MILO, for answering requests for specific book titles. The AIRS service is the most specialised being oriented primarily towards the business community. AIRS also provides for the lending of films. Such variations should not however obscure the basic nature of the services provided by the networks: information and sources of information. These are the outputs or benefits which the patron receives from the network. In this section, the financing, organisation and scope of the networks have been discussed on a comparative basis. The prime focus of this study lay however on a comparative analysis of some of the costs and benefits or inputs and outputs of the network and the remainder of this report represents an attempt at such analysis.

## III METHODOLOGY

### (1) Reference Request Form (see fig. 2)

This form was designed to determine some of the direct costs incurred during a network transaction at the resource library and the number of requests filled. For purposes of this study, each title request (including each request for photocopies of specific periodical articles or parts of books) was treated as a separate transaction while each request for information in a subject area or for specific information was treated as one transaction regardless of the number of titles required to fill such a request. Copies of the form were given to the following resource libraries. The networks served are indicated in parentheses.

(i) The Cleveland Public Library (CAIN)

(ii) Dayton and Montgomery County Public Library (MILO)

(iii) New Philadelphia-Tuscarawas County District Library (AIRS)

(iv) The Public Library of Cincinnati and Hamilton County (SWORL)

(v) Stark County District Library, Canton (AIRS)

(vi) Toledo-Lucas County Public Library (WELD)

As can be seen, two resource libraries were selected in AIRS because it is a less centralised network than the others. The staff of all these resource libraries, exhibiting remarkable patience, recorded network transactions on these forms across about a three week period in June and July. The selection of this period was determined by the availability of the consultant. It should be emphasised that the selection of this period in the Summer led to relatively lower amount of transactions generated by college students and high school students which may have biased results, because of the overall lower volume of transactions and the nature of such transactions. Such a bias however does not, we believe, invalidate the results of the study but sets limits on the interpretation of them.

(2) Cost data form (see fig. 3)

This form was sent to project directors and resource librarians in order primarily to determine costs of network activities which could not be traced on the Reference Request Forms. The determination of such costs was complicated by the sharing of equipment and services between network activities and activities of the resource library not connected with the network.

(3) Patron Questionnaires (see fig. 4)

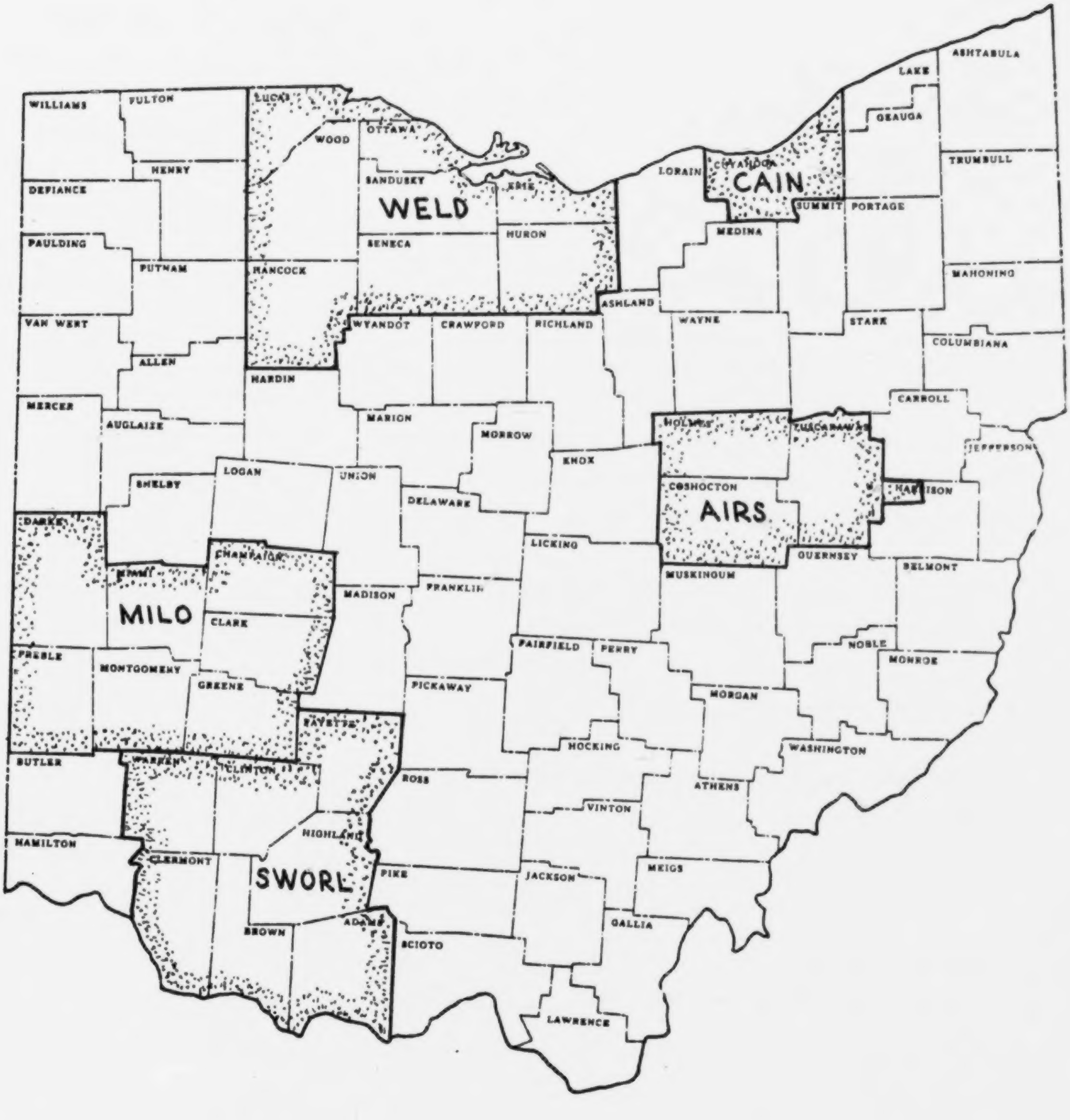
These were printed on the back of postcards and a batch of these postcards was sent to each resource library. The postcards were then enclosed with books or photocopies sent out to answer a patron request handled by the networks. The questions were designed to determine the level of patron satisfaction with the network service and so give an indication of the quality of output from the network. The questionnaire could be easily filled out and mailed to the project director of the appropriate network.

(4) Interviews with local librarians

Four local librarians from each network were interviewed to ascertain their feelings about network service and the patrons who use it. Such interviews provided some qualitative evaluation of output from the network.

- Fig. 1 -

FIVE REGIONAL REFERENCE AND INFORMATION NETWORKS


WELD
CAIN
AIRS
MILO
SWORL
WILLIAMS
FULTON
LUCAS
OTTAWA
WOOD
LAKE
ASHTABULA
GEAUGA
CUYAHOGA
LORAIN
SANDUSKY
ERIE
HENRY
DEFIANCE
TRUMBULL
SUMMIT
PORTAGE
MEDINA
HURON
SENECA
PAULDING
PUTNAM
HANCOCK
MAHONING
ASHLAND
WYANDOT
CRAWFORD
RICHLAND
WAYNE
STARK
VAN WERT
ALLEN
COLUMBIANA
HARDIN
CARROLL
MERCER
AUGLAIZE
MARION
MORROW
HOLMES
TUSCARAWAS
JEFFERSON
KNOX
LOGAN
UNION
SHELBY
COSHOCTON
HARRISON
DELAWARE
DARKE
LICKING
CHAMPAIGN
MIAMI
GUERNSEY
BELMONT
MADISON
FRANKLIN
MUSKINGUM
CLARK
NOBLE
PREBLE
MONTGOMERY
FAIRFIELD
PERRY
MONROE
GREENE
PICKAWAY
MORGAN
FAYETTE
HOCKING
WASHINGTON
BUTLER
WARREN
CLINTON
ROSS
ATHENS
VINTON
HIGHLAND
HAMILTON
CLERMONT
PIKE
JACKSON
MEIGS
BROWN
ADAMS
SCIOTO
GALLIA
LAWRENCE

- Fig. 2 -

## REFERENCE REQUEST FORM

Requesting library ____________________________________________

Request taken by ______ Request communicated by: Phone ( ) Mail ( ) Teletype ( )

Time and date request communicated ______AM/PM ___/___/72

Patron is: High school student ( ) College student ( ) Businessman ( ) Other ( )

Type of request: Subject area ( ) Specific information ( ) Specific book title or periodical article ( )

Scope of answer: Popular ( ) Technical ( ) Term paper ( ) Scholarly ( )

Time limit: Patron must have by ________ No time limit ( )

| | Name | Time spent |
|---|---|---|
| Staff time taken to receive and record request | __________ | ________ mins. |

Was request referred to a subject department? Yes ( ) No ( )

| | Name | Time spent |
|---|---|---|
| Staff time taken to search for answer or materials | __________ | ________ mins. |
| | __________ | ________ mins. |
| | __________ | ________ mins. |
| | __________ | ________ mins. |
| | __________ | ________ mins. |

Of sources searched to fill request, how many were books? ______

How many were periodicals? ______

Was answer found and/or materials located? Yes ( ) No ( ) Partially ( )

Were materials photocopied? Yes ( ) No ( ) How many pages? ______

Materials were copied from: Books ( ) Periodicals ( )

| | Name | Time spent |
|---|---|---|
| Staff time taken to photocopy materials | __________ | ________ mins. |

How was answer communicated? Phone ( ) Mail ( ) Teletype ( ) Telecopier ( )
Other (please stipulate) ________________________

Number of books sent ______

| | Name | Time spent |
|---|---|---|
| Staff time taken to communicate answer to member library | __________ | ________ mins. |
| | __________ | ________ mins. |
| | __________ | ________ mins. |
| | __________ | ________ mins. |

Cost of postage ________

Time and date reply was sent out ________AM/PM ___/___/72

Fig. 3
Cost Data Form

| | Item | Date of Purchase | Cost (Including Delivery and Installation) | Estimate Annual Depreciation |
|---|---|---|---|---|
| (1) Equipment purchased for the Resource Library for Reference Network Activities. | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| (2) Equipment purchased for the network office for Reference Network activities. | | | | |
| | | | | |
| | | | | |
| | Fiscal Year | 1971 | 1972 | 1973 (est.) |
| (3) Cost of Reference materials acquired for the Resource Library collection for Reference Network activities. | | | | |
| (4) Cost of workshops and training involved in Reference Network activities. | Staff | | | |
| | Materials | | | |
| | Others | | | |
| (5) Installation charges on equipment leased for the Resource Library for Reference Network activities. | Telephone | | | |
| | Photocopier | | | |
| | Teletype | | | |
| | Telecopier | | | |
| | Other | | | |

Fig. 3

| | Fiscal Year | 1971 | 1972 | 1973 (est.) |
|---|---|---|---|---|
| (6) Installation charges on equipment leased for the network office for Reference Network activities. | | | | |
| Telephone | | ____________ | ____________ | ____________ |
| Other | | ____________ | ____________ | ____________ |
| (Please Stipulate) | | ____________ | ____________ | ____________ |
| (7) Estimate of the number of volumes in the Reference Collection at the Resource Library as of June 1st. | | ____________ | ____________ | ____________ |

(8) Machine cost per copy to the Reference Network of photocopying material excluding staff time but including

per copy ________________

(a) depreciation costs on equipment purchased

(b) leasing costs

(c) service costs

(d) costs of supplies

| | Fiscal Year | 1971 | 1972 | 1973 (est.) |
|---|---|---|---|---|
| (9) Estimate of the share of operating costs for equipment of the Resource Library involved in Reference Network activities. Please do not include staff costs but please do include the share of the cost of depreciation attributable to Network activities, where applicable. | | | | |
| | Telephone | ____________ | ____________ | ____________ |
| | Photocopier | ____________ | ____________ | ____________ |
| | Teletype | ____________ | ____________ | ____________ |
| | Telecopier | ____________ | ____________ | ____________ |
| | Other | ____________ | ____________ | ____________ |

Fig. 3

| | Fiscal Year | 1971 | 1972 | 1973 (est.) |
|---|---|---|---|---|
| (10) Operating costs for equipment at the reference network office, excluding staff time but including depreciation | Telephone | | | |
| | Other | | | |
| | (Please Stipulate) | | | |
| (11) Cost of activities attributable to promotion of the reference network. | Staff | | | |
| | Materials | | | |
| | Other | | | |
| (12) Cost of postage for reference network activities. | For mailing out photocopies and books to patrons directly or via member library. | | | |
| | For administration activities. | | | |
| (13) Administration costs for the Network at the Resource Library not including either activities listed above or those directly related to answering requests (such as the librarian's time searching for answers) | Staff | | | |
| | Materials | | | |
| | Other | | | |
| (14) Administrative costs at the Reference Network office not including either activities listed above or those directly related to answering requests. | Staff | | | |
| | Materials | | | |
| | Other | | | |

Fig. 4

## Patron Survey Questionnaire
(printed on back of postcard)

Dear Patron,

These materials have been sent to you by means of Reference service of cooperating local libraries. To help libraries ensure that this service is responsive to your needs, I would be grateful if you would fill out the short questionnaire below and mail this card by July 21. Thank you for you cooperation.

(1) Were the materials that were sent to you (check one) very useful ( ) somewhat useful ( ) not very useful ( ) useless ( ) ?
(2) Were they delivered quickly enough? yes ( ) no ( )
(3) Will you use this service again? yes ( ) no ( )
(4) Any Comments?

## IV. THE AIRS NETWORK - SPECIAL PROBLEMS

Data collection forms were sent to the New Philadelphia-Tuscarawas County District Library and Stark County District Library, two of the resource libraries. In view of the lower level of transactions however, (a total of only six across the three week period for both libraries), no attempt was made to calculate quantitative indicators of cost and performance.

## V. CALCULATION OF COSTS

In calculating cost per transaction figures for resource libraries in all the networks, it is necessary to define carefully what costs are to be taken into account and also what transactions are being considered.

(1) Total cost per transaction handled

Cost data were obtained from the Reference Request Forms and the Cost Data Forms. With the data obtained from the latter forms, it was necessary to convert those figures taken on an annual basis to figures representing costs across the three week period in which the reference request forms were being used to record transactions. To arrive at the latter costs, annual costs were multiplied by 3/52.

Some costs were excluded because of the difficulty of assigning a share of those costs to an individual transaction. Such costs included the cost of materials acquired for the reference collection and the costs of workshops, and usually represented an investment from which benefits would be derived for an indefinite period so that it was impossible to decide what share of such costs to assign to a transaction.

The following costs were included in calculating total costs per transaction handled.

(a) Direct Labor Cost

This is the cost of staff time involved in responding to requests taken by the resource library. It includes the cost of staff time recording the requests, seeking a reply and photocopying and preparing materials for mailing, except in the case of CAIN where materials are delivered by the Cleveland Public Library's own delivery system and no such preparation is necessary. These costs were calculated on the basis of staff time as recorded on the Reference Request Forms except again the case of CAIN where the large number of title requests made such recording impossible for this type of request and necessitated the use of data provided by the project coordinator.

(b) Photocopying Cost

The machine cost of photocopying materials in order to respond to requests was calculated on the basis of an estimate of the machine costs per copy obtained from the cost data form and the number of copies made in the three week period as recorded on the Reference Request Forms, except in CAIN where the project coordinator provided such information.

(c) Mailing Cost

The cost of mailing materials in response to patron requests was calculated from the Reference Request Forms. The costs of mailing materials for administrative purposes was obtained from the Cost Data Form. This excluded staff time, which was included in Direct Labor cost.

(d) Cost of Equipment

The operating costs of telephone and teletype and other equipment were obtained from the Cost Data Form. The operating cost of the photocopier was not specifically included since such cost was included in the machine cost per copy used to find the cost of photocopying.

(e) The Cost of Promotion

This was provided from the Cost Data Form.

(f) The Cost of Administration

The cost of administration not including costs listed in any of the above items was provided by estimates in the Cost Data Form. Such costs included both the costs of staff and materials involved in such functions as planning and bookkeeping.

The total of the above costs was divided by the three week total of transactions provided by the Reference Request Forms to arrive at the cost per transaction for each network.

(2) Direct Labor Costs per transaction handled

Apart from the resources held by the resource library, a key determinant of the efficiency and effectiveness of a reference and information system is the staff who respond to requests received by the resource library. Therefore, it is useful to calculate the Direct Labor costs per transaction handled for each of the networks. Furthermore, because subject area and specific information requests are usually more complicated than title requests (including requests for copies of specific periodical articles or parts of books), it is useful to calculate direct labor cost per transaction for subject and information requests and to calculate such a cost for title requests.

(3) Cost per Transaction Filled

In addition to calculating different costs for different types of transaction handled, it is important to calculate costs per transaction filled because filled or partially filled requests represent the only tangible output of a reference and information network. These costs were calculated in the same manner as above except that for each network, cost figures for all transactions handled during the three week period were divided by the number of requests filled or partially filled rather than the number of requests handled.

## VI. TIME

Obviously a key indicator of network performance in the amount of time taken to fill or partially fill a request, or turn around time. For the purpose of this study such time was measured in all networks except CAIN from the date that the resource library recieved the request to the date that the reply was sent out either by the mailing of materials or, if no materials were sent, by telephone. In the CAIN network, the reply was classified as sent out as soon as materials were ready and awaiting delivery by the Cleveland Public Library delivery system, or if no materials were sent, as soon as a reply was communicated by teletype or telephone. Materials awaiting delivery in CAIN were delivered either the next day or the day after to the member library which handled the patron's requests. Data on the time taken to fill or partially fill requests were obtained from the Reference Request Forms for all such requests except CAIN title requests, which were not recorded on Reference Request Form. In addition to this data, information gained from the interviews with local librarians and from the patron survey were used to evaluate the speed of service of the different networks, taking into account not only turnaround time at the resource library but the delivery time also.

## VII. QUALITY OF SERVICE

The quality of service provided by reference and information networks is difficult to ascertain. One measure of quality is the proportion of total requests which resource libraries fill, or the fill rate. Date for the fill rate were obtained from the Reference Request Forms for all requests received by resource libraries except for CAIN title requests, for which data was taken directly from CAIN records. It should be emphasised that those requests which resulted in a reserve being placed on a title currently circulating were counted as not filled. Therefore, the fill rate calculated in this study for all the resource libraries is somewhat lower than the true fill rate across a period of time.

Some idea of the quality of service was also provided by the interviews with local librarians within the network and by the postcard questionnaires returned by some of the patrons who had received material from the resource libraries.

## VIII. SPECIAL PROBLEMS IN CALCULATING TOTAL COSTS PER TRANSACTION

The figures on total cost per transaction for SWORL were calculated in part from their contract with the Public Library of Cincinnati and Hamilton County, because of the difficulty in obtaining figures for the Cost Data Form. Also for CAIN, many cost figures were available only for the network as a whole, including all resource libraries, rather than for Cleveland Public Library alone, and so a total cost per transaction for the Cleveland Public Library was not calculated.

For WELD and MILO, while the author feels that most cost figures were estimated reasonably carefully, the lower volume of transactions for the three week period studied, because of the absence of many student requests, casts some doubt on the accuracy of total cost per transaction figures.

Because of these problems, the author has concluded that those cost per transaction figures calculated were not sufficiently comparable among networks to publish or use in the study. Consideration of costs has therefore been limited to Direct Labor costs per tansaction which were calculated on a more uniform and reliable basis. The cost of staff time involved directly in handling requests is a crucial input and, as such, forms a useful basis for the comparative analysis of network service.

## IX. RESULTS

The statistical results of this study are shown in tables I through V.

### (1) Direct Labor Cost

Table II indicates that CAIN (Cleveland Public Library) has very low direct labor cost per transaction, largely because CAIN handles a very large number of title requests at a relatively low direct labor cost. Part of this is attributable to the small average amount of staff time spent on handling title requests, only 8.5 minutes. Also over 88% of this time on average is spent by clerical staff earning far less than professional staff.

Somewhat higher direct labor costs per transaction for subject area and specific information requests can be explained by the larger amount of staff time spent on such requests and the high costs of reference personnel handling the requests.

### (ii) MILO

MILO has the highest direct labor costs per transaction handled for all types of requests. In addition MILO has the highest cost per transaction filled or partially filled for all transactions except title requests, which are all requests for photocopies of specific periodical articles.

Part of this high direct labor cost can be attributed to the nature of MILO requests, which are predominantly subject area and specific information requests. The predominance of such requests results from the provisions of the MILO contract which do not authorise the handling of requests for specific book titles. The handling of subject area and specific information requests usually requires a greater amount of time and degree of expertise than is necessary to handle title requests, which constitue the larger part of requests in CAIN, SWORL and WELD. Therefore, while the direct labor cost per transactions for all requests is very much higher in MILO than in the other networks, the direct labor cost per transaction for subject area and specific information requests in MILO, while also higher, is much closer to the direct labor costs for such transactions in the other three networks. Nonetheless, this cost is still higher than for the other networks. The Table V helps indicate why. While the average amount of staff time spent on subject area and specific information requests is equal to 40.8 minutes, 34.7 minutes and 31.6 minutes in the CAIN, SWORL and WELD networks respectively, MILO takes on average about 45.7 minutes of staff time to handle such requests. Furthermore the cost of such staff time in MILO is higher. Of the staff time spent handling these requests, 83% is spent by the Project Director himself.

(iii) SWORL

SWORL has somewhat low costs per transaction for title requests but not so low costs for subject and information requests. Again this data can be explained in terms of the staff time spent on handling transactions.

(iv) WELD

WELD has low costs per transaction for both title requests and for subject and specific information requests. The low cost for the latter type of requests is not only attributable to the smaller amount of staff time spent on such transactions but also to the low cost of such time. Of the time spent by staff on subject and specific information requests in WELD 25% is spent by staff earning less than $3.00 per hour. Comparable figures for CAIN, MILO and SWORL are 4%, 17% and 5 1/2%, respectively.

(2) Time

(i) AIRS

As noted in Section IV of the paper, no attempt was made to formally evaluate the time taken to fill or partially fill a request, because of the small number of transactions recorded. The only information available therefore was from survey questionnaires returned by patrons and interviews with local librarians. The three patrons who returned questionnaires were all satisfied with the speed of the service and so also were the local librarians.

(ii) CAIN

As can be seen in Table III, no specific figures were available on the time taken to fill a title request in the CAIN network. According to project coordinator, Dennis Gormley such requests are usually filled the same day and materials at that point are ready for delivery. However, the time taken to fill subject and specific information requests appears to be much longer.

Of the materials and information sent out in response to title requests, 39.4% were not communicated or ready for delivery until the second day after the requests had been received or later. This figure is higher than for MILO, SWORL or WELD. This relatively long turn around time is however somewhat offset by the speed of the Cleveland Public Library's own delivery system. Materials ready for delivery are delivered to the member library requesting them either the next day or is a few cases the day after.

According to the local librarians interviewed and the twenty-two patrons who returned the survey questionnaires, the speed of service is satisfactory, usually within two or three days.

(iii) MILO

Table III indicates that MILO seems to fill or partially fill its requests with greater speed than any of the other networks. 93.3% of materials or information searched and found in response to requests were sent out on the same day that the request was received or the day after. This short turnaround must in great part be laid to the efforts of the Project Director, Don Paul, who personally mails much of the material on his way home every evening. In addition, photocopies are mailed in many cases directly to the patron who requested them, speeding up service even more. Therefore it is quite normal for patrons to receive materials the day after they requested them. In view of this fact, it is hardly surprising that the local librarians interviewed and the nine patrons who returned questionnaires were all satified with the speed of network service.

(iv) SWORL

According to Table III, SWORL appears to be slightly slower than other networks in filling requests. 67.5% of replies sent out for filled or partially filled requests are sent or communicated the first or second day after the request is received or later. In addition, the poor mail service in the Cincinnati area slows network service considerably. According to the local librarians interviewed, the mail service poses a major obstacle to good network service. Surprisingly enough, of the eight patrons who returned questionnaires, only one commented on the slowness of the service and all felt materials were delivered quickly enough.

(v) WELD

WELD takes somewhat less time to fill or partially fill requests than CAIN or SWORL. 73.7% of replies to requests filled or partially filled are sent out or communicated either the same or the next day. Turnaround time for subject area and specific information requests are even faster. 82.9% of replies to such requests are sent out or communicated either on the same or the next day. As in the other networks, both local librarians interviewed and patrons, who returned questionnaires indicated satisfaction with the speed of service.

(vi) Overall Observations On Time

In spite of variations in the time taken by networks to fill or partially fill requests, both patrons and local librariams seem satisfied with the speed of service. Perhaps such a favorable response can be laid to the newness of these regional networks. It is probably so that librarians and patrons are so pleased to have the network service that they are at present not too critical of the speed of that service. However, it should be expected that as patrons and librarians become more accustomed to using networks, they will raise their level of expectations and want faster service.

(i) AIRS

No fill rates were calculated for AIRS because of lack of sufficient transactions. Local librarians interviewed were enthusiastic about the quality of service provided and felt the service they provided to patrons was greatly strengthened by the element of cooperation made possible by the AIRS network. Patrons who returned questionnaires felt that the materials sent to them in response to their requests were very useful and said that they would use the service again.

(ii) CAIN

The fill rate for Cleveland Public Library in CAIN is low. Of total requests submitted, according to Table IV, only 27.8% were filled or partially filled and only 25.6% of title requests were filled. It should be remembered however that CAIN is a somewhat decentralised network so that many title requests unfilled by Cleveland Public Library were later filled by other member libraries. The fill rate for subject and specific information requests, which are taken only by Cleveland Public Library, is much higher than for title requests but somewhat lower than for subject and specific information requests in other networks.

Local librarians interviewed felt very favorably towards the CAIN network service as did most of the twenty-two patrons who returned questionnaires. One patron mentioned that he would like to see periodicals loaned within the network, because he found the cost of photocopying too high.

(iii) MILO

According to Table IV, the fill rate for total requests in MILO is relatively high compared to the same fill rates in other networks. However the fill rate for subject and specific information requests in MILO is somewhat lower than the same fill rates in other networks. About 27% of such MILO requests are not filled at all.

Both librarians interviewed and patrons who returned questionnaires were, however, pleased with network service.

(iv) SWORL

SWORL's fill rate for title requests is, like CAIN's, comparatively low (45.5% are filled) but its fill rate for subject and information requests is high (over 86% are filled or partially filled). Librarians interviewed and patrons who returned questionnaires were generally favorable towards network service.

(v) WELD

WELD's fill rate seems fairly high for title requests and very high for subject and specific information requests. Only 10.2% of subject and specific information requests are not filled; the lowest figure of the four networks studied. Again, the evaluation of network service by local librarians and patrons was favorable.

### (4) Overall Observations On Quality

Quality, as measured by the fill rate, appears to vary far more than the more subjective evaluation of quality by local librarians and patrons. As in the case of the speed of the service however, perhaps the networks have not been operating long enough to arouse criticism about quality. Both librarians and patrons are so pleased at the availability of network service that they are not yet critical of the quality of such service.

## X BENEFITS AND COSTS - Conclusions

Conceptually a reference and information network may be regarded as a system in which costs are the inputs and the time taken to fill or partially fill requests, the fill rate and the quality of service are indicators of outputs. Benefit cost analysis ideally should yield the amount of extra output produced by an extra unit of input or what economists term the marginal product of the system While, in view of the small number of networks studied, it is impossible to arrive at such a marginal product, it is possible to suggest some of the relationships between inputs and outputs in a reference and information network.

(1) Firstly, the most obvious conclusion that can be drawn from the information gathered is that while title requests are cheaper to handle than subject and specific information requests, they are less likely to be filled. This lies in the fact that a subject or information request can be satisfied from a variety of sources whereas a title request by its very nature can only be satisfied by one source, the title itself. Furthermore, a subject or information request, unlike a title request, may at least be partially filled if sufficient resources for a full answer are not present. This conclusion suggests that a network can increase its fill rate by taking a smaller proportion of title requests in relation to total requests. One might object that such a course of action is impossible because the composition of total requests is set by the patrons' demands, not the network, but this is not entirely true. Interviews with local librarians suggest that many patrons' requests, which start out as subject requests, are converted into title requests for the network by local librarians and their staff with the use of indexes and catalogues, except in MILO where no title requests for books are handled. Therefore, CAIN, SWORL and WELD might increase their fill rates by asking local librarians and their staff not to convert subject and specific information requests into title requests, but merely to suggest to the resource library a title or titles which might be used to fill a particular subject or specific information request at the time they make such a request. Obviously, the networks should be aware that submitting requests as subject

or specific information requests rather than as title requests would increase their direct labor costs per transaction at the resource library, because where a resource library could not provide the suggested title or titles, resource library staff would spend time searching for alternative material. Therefore, should such a course of action be adopted, it would be necessary to increase the amount of compensation for the network activities of the resource libraries, but given the potential for an increase in the fill rate and hence patron satisfaction, the CAIN, SWORL and WELD networks should consider this alternative. MILO should also consider such an alternative if title requests for books are handled in the future.

(2) One very clear conclusion that can be drawn from the data or rather lack of data is that there is a need for great change in the AIRS network. While the local librarians interviewed and the three patrons who returned questionnaires expressed a favorable response towards AIRS, it seems clear that the network has generated insufficient transactions to justify the considerable federal funding it receives for the handling of such transactions. Part of the problem, in the authors opinion lies in the lack of promotion to groups outside the business community. Greater attempts should be made to make community groups and local schools aware of network activities. While there may be a great need for network service in this area, it must be stressed that the local community may not be conscious of available network response to that need and it is the responsibility of the network to make them conscious. Admittedly this would change the original focus of AIRS activities away from the business community, but it is the opinion of the author that

such a change in focus by raising public awareness may actually increase useage of the network service by businessman. For example, MILO is not particularly a business-directed project but the reputation that it has gained serving groups other than business has attracted increased business useage. The Piqua, Troy and Xenia libraries of the MILO network see businessmen as among the greatest users of network service, although the author has no statistical data to verify such an observation.

(3) CAIN, which is entirely locally funded, generates more specific title transactions than any other network at a considerably lower direct labor cost per transaction. The large number of title requests and low costs per transaction suggest that a network may reap economies of scale by generating more transactions. However, the large number of such requests must be held in some part responsible also for the low fill rate of the Cleveland Public Library. Fortunately, CAIN is a decentralised network so that the total fill rate for all member libraries, acting as resource libraries, may be considerably higher. Annual reports from CAIN suggest that this may be the case.

(4) There appears to be an inverse relationship between direct labor cost per transaction and turnaround time. In view of the fact that higher direct labor costs reflect to a great extent increased staff time spent on transactions, this relationship at first glance seems implausible. However turnaround time includes not only staff time spent on transactions but also the time that passes when unfinished transactions are set aside. While a higher direct labor cost per transaction may not increase turnaround time, it is not clear how such a higher cost reduces turnaround time. Part of the answer may however lie in the relative involvement of high-paid project directors in

handling requests. It is interesting to note that in MILO and WELD, which have the fastest turnaround times, the project director handles many requests whereas in CAIN and SWORL the project director is not involved directly in handling requests. This suggests that involvement of the project director in handling requests, while more costly, brings a greater measure of committment, reflected in the turnaround time. Such a finding is certainly supported by the comments of local librarians on the performance of MILO project director.

(5) The high costs per transaction of the MILO network warrant some extra discussion. Such costs may be justified in great part by the faster turnaround time and quality of service as seen by local librarians. However, should the MILO network obtain authorisation to handle specific title requests, the increased number of transactions will increase total costs by a very large amount. According to one local librarian, such an authorisation would at least double the number of incoming requests. It is the opinion of the author that in order to save costs, the project director should not handle title requests personally but leave them to junior staff. Such requests do not require the expertise of the project director and it is a waste of his very valuable time to have him handle such requests. In any case, the increased burden of title requests may be physically too great for the project director to handle alone, so that the network will have to make greater use of the junior staff.

(6) There is at first glance an inverse relationship between the direct labor cost per transaction and the fill rate for subject and specific information requests. This would suggest that the higher the input of direct labor the lower the output in terms of fill rate, a case of what economists

term "diminishing returns". A look at Table VI however suggests a more plausible explanation. Both CAIN and MILO, which have lower fill rates on average, spend much more staff time on requests which are eventually not filled than do SWORL or WELD. This suggests that the staff at CAIN and MILO do not give up searching for materials quite so quickly as do the staff at SWORL and WELD. The lower fill rates for CAIN and MILO therefore lead to a higher cost per transaction, because their staff spend more time on requests eventually not filled. The explanation however for the lower fill rates for subject and specific information requests in CAIN and MILO is not clear. It is possible that both networks are receiving requests, which are tougher to fill than the requests received by other networks, since CAIN receives a large volume of requests from college students and MILO receives many requests from businessmen.

(7) The long turnaround time at the resource library combined with poor mail service severely restricts the potential service in the SWORL network. The MILO data suggests that turnaround time can be increased greatly by the designation of one staff member at the resource library with exclusively network responsibilities including the handling of requests. Perhaps, the SWORL network could increase turnaround time by the designation of a staff member with similar responsibilities. The problem of poor mail service is harder to solve. SWORL already provides for the mailing of photocopies directly to patrons but could speed up service by mailing books in the same manner. The direct mailing of books is controversial, but, given that the prime goal of a network is quick and quality service to patrons,

such an alternative should seriously be considered not only by SWORL but also by all the other networks except CAIN, which has access to a very efficient delivery service.

The SWORL network might alteratively seek to speed up service by establishing a delivery system. Such a system would admittedly be more difficult and costly to operate than that of the Cleveland Public Library, because of larger more rural area covered by the SWORL network. However, it might be feasible to pay somebody to deliver materials in his or her own car, to member libraries.

This section has been devoted to a discussion of some of the input-output relationships suggested by information gathered and also of some recommendations which appear to the author to follow from such relationships. These recommendations represent suggestions for future action.

## XI. FUTURE RESEARCH

The growth of regional networks has been an important response to the need for quality library service throughout the state. The purpose of this study has been to comparatively analyse five of these networks from the point of view of inputs and outputs and to suggest the possible form of new inputs. While this study is one of the first for Ohio, it should not be the last. Analysis is an ongoing process and an essential part of the policy-making mechanism. In particular, more data should be obtained, using reference request forms similar to those used in this study, during the school year so as to assess the real impact of the student group on network transactions in terms of cost, turnaround time and quality. Furthermore, a patron survey should be repeated during the school year. Such a survey should be timed at a later date and designed so as to bring out possible defects in network service.

This study has indicated the problems in evaluating the total costs of network service to a resource library. The problems suggests that more uniform record-keeping is necessary in recording total costs for a resource library, if proper evaluation is sought.

Finally more analysis is needed of the precise effect of contractual provisions on network performance so that a network is not unnecessarily constrained by such provisions and makes maximum use of its resources.

## TABLE I

## REQUESTS RECEIVED DURING THE THREE WEEKS IN JUNE AND JULY

| NETWORK | TOTAL REQUESTS | SPECIFIC TITLE REQUESTS * | SUBJECT AREA OR SPECIFIC INFORMATION REQUESTS |
|---|---|---|---|
| CAIN | 930 | 888 | 42 |
| MILO | 58 | 10 | 48 |
| SWORL | 142 | 112 | 30 |
| WELD | 166 | 127 | 39 |

* Including requests for photocopies of a specific periodical article or part of a book.

## TABLE II

## DIRECT LABOR COSTS PER TRANSACTION FOR FOUR NETWORKS ($) FOR THE THREE WEEK PERIOD IN JUNE AND JULY

| ALL REQUESTS | DIRECT LABOR COST PER TRANSACTION HANDLED | DIRECT LABOR COST PER TRANSACTION FILLED OR PARTIALLY FILLED |
|---|---|---|
| CAIN | 0.39 | 1.38 |
| MILO | 3.22 | 4.15 |
| SWORL | 1.10 | 2.03 |
| WELD | 1.23 | 1.73 |
| TITLE REQUESTS* | | |
| CAIN | 0.27 | 1.07 |
| MILO | 1.40** | 1.40 |
| SWORL | 0.75 | 1.65 |
| WELD | 1.02 | 1.56 |
| SUBJECT AREA AND SPECIFIC INFORMATION REQUESTS | | |
| CAIN | 2.77 | 3.63 |
| MILO | 3.60 | 4.93 |
| SWORL | 2.42 | 2.79 |
| WELD | 1.93 | 2.16 |

* Including requests for photocopies of specific periodical articles and parts of books.

** Photocopies of periodical articles only.

## TABLE III

### TURNAROUND TIME OR TIME TAKEN TO SEND OUT REPLIES FOR FILLED OR PARTIALLY FILLED REQUESTS ACROSS THE THREE WEEK PERIOD IN JUNE AND JULY

|  | TOTAL NUMBER REPLIES FOR FILLED OR PARTIALLY FILLED REQUESTS | PERCENT SENT OUT |  |  |
|---|---|---|---|---|
| ALL REQUESTS |  | SAME DAY | NEXT DAY | LATER |
| CAIN | 259 | * | * | * |
| MILO | 45 | 86.7 | 6.6 | 6.6 |
| SWORL | 77 | 35.0 | 32.5 | 32.5 |
| WELD | 118 | 25.4 | 48.3 | 26.3 |
| TITLE REQUESTS |  |  |  |  |
| CAIN ** | 227 | * | * | * |
| MILO | 10 | 90.0 | 0 | 10.0 |
| SWORL | 51 | 31.4 | 37.2 | 31.4 |
| WELD | 83 | 19.3 | 50.6 | 30.1 |
| SUBJECT AREA AND SPECIFIC INFORMATION REQUESTS |  |  |  |  |
| CAIN | 32 | 33.2 | 24.2 | 39.4 |
| MILO | 35 | 85.7 | 8.6 | 5.7 |
| SWORL | 26 | 42.3 | 23.1 | 34.6 |
| WELD | 35 | 40.0 | 42.9 | 17.1 |

* Exact figures not available.

** According to CAIN Project Director, most replies to title requests are sent out same day.

## TABLE IV

## FILL RATE
## FOR THE THREE WEEK PERIOD IN JUNE AND JULY

| ALL REQUESTS | TOTAL REQUESTS | PERCENT REQUESTS FILLED | PERCENT REQUESTS NOT FILLED | PERCENT REQUESTS PARTIALLY FILLED |
|---|---|---|---|---|
| CAIN ** | 930 | 26.9 | 72.2 | 0.9 |
| MILO | 58 | 62.1 | 22.4 | 15.5 |
| SWORL | 142 | 52.8 | 45.8 | 14.0 |
| WELD | 166 | 67.5 | 28.9 | 3.6 |
| TITLE REQUESTS | | | | |
| CAIN ** | 888 | 25.6 | 74.4 | * |
| MILO | 10 | 100.0 | 0 | * |
| SWORL | 142 | 45.5 | 54.5 | * |
| WELD | 127 | 65.3 | 34.7 | * |
| SUBJECT AREA AND SPECIFIC INFORMATION REQUESTS | | | | |
| CAIN ** | 42 | 57.1 | 23.8 | 19.1 |
| MILO | 48 | 54.2 | 27.1 | 18.7 |
| SWORL | 39 | 80.0 | 13.3 | 6.7 |
| WELD | 30 | 74.4 | 10.2 | 15.4 |

* A request for a specific title cannot be partially filled because it is either filled or not filled.

** Cleveland Public Library only.

## TABLE V

## AVERAGE AMOUNT OF STAFF TIME SPENT * ON EACH TRANSACTION (IN MINUTES) DURING THE THREE WEEK PERIOD IN JUNE AND JULY

| NETWORK | ALL TRANSACTIONS | SPECIFIC TITLE REQUESTS | SUBJECT AREA OR SPECIFIC INFORMATION REQUESTS |
|---|---|---|---|
| CAIN | 8.5 | 6.9 | 40.8 |
| MILO | 42.8 | 28.6 | 45.7 |
| SWORL | 16.0 | 11.0 | 34.7 |
| WELD | 20.2 | 16.7 | 31.6 |

* Includes:

(i) staff time taken to record request

(ii) staff time taken to search for answer

(iii) staff time taken for photocopying

(iv) staff time in MILO, SWORL and WELD for preparing materials for mailing

(v) other staff time taken communicating an answer or the fact that no answer could be found

# TABLE VI

## AVERAGE AMOUNT OF STAFF TIME SPENT ON EACH SUBJECT AND SPECIFIC INFORMATION REQUEST (IN MINUTES) DURING THE THREE WEEK PERIOD IN JUNE AND JULY

|  | TIME TAKEN TO HANDLE |  |
|---|---|---|
| NETWORK | REQUESTS FILLED OR PARTIALLY FILLED | REQUEST UNFILLED |
| CAIN | 36.5 | 54.4 |
| MILO | 41.7 | 56.5 |
| SWORL | 37.1 | 18.5 |
| WELD | 31.7 | 30.3 |